

## Types of energy storage berlin

Battery systems encompass everything from individual cells to battery packs, including the connection, sensors, casing and tests for energy storage solutions as well as battery management. Battery systems are designed based on their objective which is shaped by the power, energy, and grid connection requirements.

In their annual Energy Storage Inspection, the Solar Storage Systems research group at HTW Berlin compares and evaluates the energy efficiency of PV battery systems. Since 2018, 30 manufacturers with a total of 82 storage solutions have partaken, including well-known companies such as BYD, Fenecon, Fronius, HagerEnergy, Kostal, SMA, Sonnen and ...

In the Smart Grid Laboratory at TU Berlin, electricity, heating and cooling grids, including generators, storage systems and consumers, can be simulated in their interaction. HTW Berlin has a special focus on the intelligent linking of photovoltaic systems with battery and heat storage.

The Berlin Energy and Climate Protection Programme provides subsidies for the investment costs of electricity storage systems if a photovoltaic system is installed at the same time. The IBB Business Team GmbH implements the program.

In the energy self-sufficient village of Feldheim in Brandenburg, consumers and businesses are supplied directly with energy from the locally installed renewable energy plants (wind, biogas and wood chips) via private local heating and electricity grids. A battery storage system is used to compensate for fluctuations in the wind energy supply.

In ENERTRAG's hydrogen hybrid power plant, green hydrogen is produced from wind power by electrolysis and stored. If required, this can be converted into electricity and heat in the combined heat and power plant. Hydrogen can also be used to refuel cars and buses as well as in industrial processes.

On the EUREF-Campus in Berlin, a nearly CO<sub>2</sub>-neutral energy supply will be realized with the help of a local micro smart grid with central load management by NBB Netzgesellschaft Berlin-Brandenburg. Furthermore, the GASAG Solution Plus built a 500 kW<sub>el</sub> P2H plant in combination with a P2C system and integrated it into the existing heating and cooling supply. This means that excess energy can be flexibly stored in the form of heat and cold in the event of heavy network loads.

In Berlin, the company Vattenfall Wärme operates Europe's largest power-to-heat plant. Its total output of 120 megawatts corresponds thermally to an output of around 60,000 standard water boilers. It replaced the hard coal unit "C" of the Reuter CHP plant and supplies up to 30,000 households with district heating. The system is preferably operated with electricity from renewable energies.

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Blockheizkraftwerks- Träger- und Betreibergesellschaft mbH Berlin (BTB) has been operating its innovative cogeneration system with a river water heat pump at the cogeneration plant Schöneide since 2022. It has a thermal output of around 3 MW making it the most powerful system of this type in Berlin.

„The specific combination of Brandenburg, a region with a high level of wind energy conversion, and Berlin, which has a high population density, offers outstanding potential for integrating renewable energy. Smart grid technology can be used to control storage systems and flexible loads, and managing cross-medial grids for electricity and heat.”

However, many cells of a battery can still be "healthy," meaning they can still save energy efficiently. Even the chip contained in each laptop battery, which measures quantities such as current, temperature, voltage, etc. and balances the cells and performs safety functions, could be reutilized. With all these "ingredients" you have the opportunity to build a new cheap battery, which could be used, for example, as energy storage for a house.

Although the energy density will be lower than that of a new battery, this solution could be advantageous in poor countries where there is a great need for cheap energy storage. This is especially the case in small villages that have no reliable energy supply or for the integration of renewable energy such as solar and wind into the local power grid. In such an environment, the batteries can have a second life!

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